

## ABSTRACT

The present invention provides bacterial immunogenic agents for administration to humans and non-human animals to stimulate an immune response. It particularly relates to the vaccination of mammalian species, especially human patients, with variants of the *E. coli* FimCH protein that elicit antibodies that have better functional inhibitory activity than antibodies raised against wild type protein. In particular, such variants include mutations that promote a more open confirmation of the FimH protein, particularly in regions involved in mannose binding, to expose regions previously poorly exposed and mutations that abolish a significantly reduce mannose binding. In another aspect, the invention provides antibodies against such proteins and protein complexes that may be used in passive immunization to protect or treat pathogenic bacterial infections. The present invention also provides machine readable media embedded with the three-dimensional atomic structure coordinates of FimCH bound to mannose, and subsets thereof, and methods of using the crystal structure to provide candidate amino acid residues for mutation.